UNITED STATES GOVERNMENT

memorandum

DATE: July 25, 2001

TO: Magalie Roman Salas, Secretary, FCC

FROM: Wireless Telecommunications Bureau Policy Division

SUBJECT: CC Docket 94-102 – Unredacted Version of Cingular Wireless LLC's Request for Partial Waiver of the E911 Phase II Location Technology Implementation Rules

The Wireless Telecommunications Bureau Policy Division hereby submits for the record the attached unredacted version of Cingular Wireless LLC (Cingular)'s Request for Waiver of the E911 Phase II Location Technology Implementation Rules (Cingular Waiver Request). Cingular originally submitted its waiver request on July 6, 2001 in a redacted form due to its request for confidential treatment of certain material. On July 17, 2001, the Wireless Telecommunications Bureau issued an order denying confidentiality to certain material submitted in conjunction with the Cingular Waiver Request (DA 01-1712). Specifically, the order denied confidentiality for Attachments D, E, and F and information contained in the body of the Cingular Waiver Request related to these attachments. This unredacted version of the Cingular Waiver Request makes public this information that was previously marked confidential.[1]

[1] One reference to a specific third party equipment vendor contained in Attachment D will be redacted, as it is not material to the test results we seek to make public.

CONFIDENTIAL VERSION

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

NOT FOR PUBLIC INSPECTION

In the Matter of	)	
	)	
Revision of the Commission's Rules	)	CC Docket No. 94-102
to Ensure Compatibility with Enhanced	)	
911 Emergency Calling Systems	)	
	)	
Cingular Wireless LLC	)	DA 98-2631
Request for Waiver of Sections 20.18(e)-(h)	)	
of the Commission's Rules	)	

To: Wireless Telecommunications Bureau

PETITION FOR LIMITED WAIVER OF SECTIONS 20.18(e)-(h)

J. R. Carbonell
Carol L. Tacker
David G. Richards
5565 Glenridge Connector
Suite 1700
Atlanta, GA 30342
(404) 236-5543

Its Attorneys

July 6, 2001

NOT FOR PUBLIC INSPECTION

CONFIDENTIAL VERSION

SUMMARY

Cingular Wireless LLC ("Cingular") hereby requests a waiver of the Phase II enhanced 911 ("E911") obligations set forth in Sections 20.18(e)-(h). Specifically, Cingular seeks a waiver that would permit it to deploy the following Phase II location technologies: (i) Enhanced Observed Time Difference ("E-OTD") technology for its GSM networks; and (ii) a switch-based location technology on its TDMA networks that has the potential to improve on recently reported test results for the Mobile-Assisted Network Location System ("MNLS"). The waiver is necessary because these solutions do not currently meet the Phase II accuracy requirements and cannot be deployed prior to the Phase II Implementation deadlines.

Cingular requests authorization to deploy E-OTD over its GSM networks because it is the only viable option. Virtually every other GSM carrier also has indicated that it plans on deploying E-OTD. Although this solution will not meet the Commission's handset-based accuracy standards initially, E-OTD accuracy will continue to improve as the software is refined. Initially, this technology should be capable of supplying accuracy of 100 meters/67 percent of the time and 300 meters/95 percent of the time, but an industry consensus appears to be forming that E-OTD handsets will satisfy the Commission's accuracy requirements by October 1, 2003. Upon grant of the waiver, Cingular will deploy E-OTD handsets to new subscribers at the following rate:

- one entry-level handset model will be available by October 1, 2001;
- 25% of all handsets sold by December 31, 2001;
- 40% of all handsets sold by March 31, 2002;
- 65% of all handsets sold by June 30, 2002;
- 100% of all handsets sold by September 30, 2002.

In addition to deploying E-OTD, Cingular proposes a "safety net" location technology solution similar to the NSS solution proposed by VoiceStream whereby GSM subscribers without E-OTD handsets could be located within a radial accuracy of 1000 meters for 67 percent of calls. This will ensure that location information is available for the embedded GSM base. Deployment of this solution can commence in first quarter 2002, and can be fully deployed by second quarter 2002. Grant of the requested waiver for Cingular's GSM networks would serve the public interest by: (i) eliminating any uncertainty surrounding whether the solution chosen by Cingular satisfies the FCC's rules; (ii) permitting Cingular to move forward with the deployment of the only viable GSM solution; and (iii) ensuring that Cingular's subscribers have access to Phase II location information when roaming on GSM networks.

With regard to its TDMA networks, Cingular has decided to migrate from this air interface. Thus, the Phase II solution chosen for these networks will only be temporary. Whether temporary or permanent, however, there is no solution that will satisfy the Commission's Phase II requirements. Accordingly, Cingular proposes to deploy a switch-based technology that can locate callers within 250 meters for 67 percent of calls and within 750 meters for 95 percent of calls. This is the only feasible solution. Handset solutions are not possible because vendors have announced that they will not be

devoting substantial resources to this air interface. Other network-based solutions are not feasible because they (i) do not satisfy the Commission accuracy requirements, (ii) take much longer to deploy than a switch-based solution, and (iii) cost substantially more than a switch-based solution.

Cingular is in the process of selecting a vendor for supplying a switch-based Phase II solution. Immediately upon grant of this request, Cingular will begin building the databases that are a necessary component of any switch-based solution. Cingular's initial database targets will be in markets where there are outstanding PSAP requests six months old and where the switch modifications will be completed first. Accordingly, Cingular requests a waiver of Section 20.18(f) that would permit it to deploy a switch-based solution as follows:

- June 30, 2002, 100 percent of Cingular's coverage area served by an Ericsson switch, or within 6 months of a PSAP request, whichever is later; and
- February 28, 2003, 100 percent of Cingular's coverage area served by all other switches (Lucent and Nortel), or within 6 months of a PSAP request, whichever is later.

The public interest will be served by granting this waiver for Cingular's TDMA networks because the switch-based solution will cover Cingular's entire TDMA customer base and can be deployed more quickly and economically than any other solution. Moreover, Cingular will endeavor to ensure that the TDMA networks converted to a new air interface are fully compliant with the Commission's Phase II requirements from the outset. Denial of the waiver has no substantial public interest benefit and may force Cingular to choose a more expensive network-based "solution" that fails to meet the FCC's accuracy requirements and will take considerably longer to deploy.

At the time the Phase II rules were adopted, there was no technology that satisfied the requirements. The Commission envisioned, however, that the technology would develop in time to satisfy the rules. This has not happened. Many vendors claim that they have compliant solutions, but none of these claims has proven true in real-world testing. Thus, carriers are faced with the following choice: either to deploy a Phase II solution based on vendors' claims that the solutions are compliant, and run the risk of enforcement action when the solutions do not satisfy the Commission's rules, or seek a waiver of the requirements to rapidly deploy reasonably accurate Phase II technologies. Cingular has chosen the latter course.

TABLE OF CONTENTS

CONFIDENTIAL VERSION

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Revision of the Commission's Rules	)	CC Docket No. 94-102
to Ensure Compatibility with Enhanced	)	
911 Emergency Calling Systems	)	
	)	
Cingular Wireless LLC	)	DA 98-2631
Request for Waiver of Sections 20.18(e)-(h)	)	
of the Commission's Rules	)	

To: Wireless Telecommunications Bureau

PETITION FOR LIMITED WAIVER OF SECTIONS 20.18(e)-(h)

Cingular Wireless LLC ("Cingular"), on behalf of its subsidiaries[1] and pursuant to Sections 1.3 and 1.925 of the Commission's rules,[2] hereby requests a limited waiver of the Phase II enhanced 911 ("E911") obligations set forth in Sections 20.18(e)-(h). Specifically, Cingular seeks a waiver that would permit it to deploy the following Phase II location technologies: (i) Enhanced Observed Time Difference ("E-OTD") technology for its GSM networks; and (ii) a switch-based location technology on its TDMA networks that has the potential to improve on recently reported test results for the Mobile-Assisted Network Location System ("MNLS"). The waiver is necessary because these solutions do not currently meet the Phase II accuracy requirements and cannot be deployed prior to the

[1] A list of the companies covered by this waiver request is attached. Throughout this filing, the term Cingular is used to refer to Cingular, its predecessors-in-interest, subsidiaries, and affiliates.

[2] 47 C.F.R. §§ 1.3, 1.925.

Phase II Implementation deadlines. For the reasons set forth herein, good cause is shown for the waiver.

I. PHASE II E911 REQUIREMENTS AND WAIVER STANDARD

In 1996, the Commission adopted rules to ensure the availability of 911 services via wireless handsets.[3] Because of the transient nature of wireless phones, the Commission required commercial mobile radio service ("CMRS") licensees ("covered carriers") to provide the location of 911 callers to public safety answering points ("PSAPs"). Sections 20.18(e)-(h) of the Commission's rules require that covered carriers deploy a technology for supplying Phase II location information (*i.e.*, latitude/longitude) for 911 calls as early as October 1, 2001. The accuracy specified for Phase II location information varies depending upon the type of technology solution deployed:

- Network-based technologies: 100 meters for 67 percent of calls; 300 meters for 95 percent of calls;[4]
- Handset-based technologies: 50 meters for 67 percent of calls; 150 meters for 95 percent of calls.[5]

At the time these requirements were adopted, no other country in the world required wireless carriers to provide emergency number services with similar accuracy. This fact remains unchanged today.

Generally, waivers of the Commission's rules will be granted if the underlying purpose of the rule would not be served by strict enforcement and grant is in the public interest, or there are unique or unusual factual circumstances that render application of the rule unduly burdensome, inequitable,

---

[3] *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems,* CC Docket No. 94-102, *First Report and Order and Further Notice of Proposed Rulemaking*, 11 F.C.C.R. 18676, 18712 (1996).

[4] 47 C.F.R. § 20.18(h)(1).

[5] 47 C.F.R. § 20.18(h)(2).

contrary to the public interest or there is no reasonable alternative.[6] As shown below, good cause exists for waiving the accuracy requirements and implementation deadline contained in Sections 20.18(e)-(h) of the Commission's rules. At least one waiver of Section 20.18 has been granted by the Commission based, in part, on the absence of a technical solution for supplying Phase II location information[7] and other waiver requests are pending.[8]

Although not set forth in the Commission's rules governing waivers, the Commission has indicated that parties seeking a waiver of the Phase II E911 rules should demonstrate a "clear path to full compliance."[9] There is, however, *no* solution available that would fully satisfy the Commission's accuracy requirements for TDMA and GSM networks. Moreover, because Cingular is not a technology vendor, it cannot predict with precision when solutions will exist for its networks. Instead,

---

[6] 47 C.F.R. §§ 1.3, 1.925; *see also Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990) (citing *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir 1969), *cert. denied*, 409 U.S. 1027 (1972)).

[7] *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, *Fourth Memorandum Opinion and Order*, 15 F.C.C.R. 17442, 17460-64 (2000), *recon. pending* ("*Fourth MO&O*").

[8] *See, e.g.,* Corr Wireless Communications, L.L.C., Petition for Waiver, CC Docket No. 94-102 (June 22, 2001); D&E/Omnipoint Wireless Joint Venture, L.P., Petition for Waiver of the E-911 Phase II Location Technology Implementation Rules, CC Docket No. 94-102 (Jun. 20, 2001) ("PCS One Waiver"); Cincinnati Bell Wireless, LLC, Petition for Waiver of the Phase II Location Technology Implementation Rules, CC Docket No. 94-102 (May 1, 2001); AT&T Wireless Services, Inc., Request for Waiver of the E911 Phase II Location Technology Implementation Rules, CC Docket No. 94-102 (April 4, 2001) ("AT&T Waiver"); Carolina PCS I Limited Partnership, Petition for Waiver, CC Docket No. 94-102 (Feb. 6, 2001) ("Carolina PCS Waiver"); Hawaiian Wireless, Inc., Petition for Waiver, CC Docket No. 94-102 (Nov. 9, 2000); Nextel Communications, Inc. E911 Implementation Report and Waiver, CC Docket No. 94-102 (Nov. 9, 2000).

[9] *Fourth MO&O*, 15 F.C.C.R. at 17457-58.

Cingular is proposing to deploy Phase II location technologies that will satisfy the Commission's directive that "if no solution is available that fully complies, the carrier [is] expected to employ a solution that comes as close as possible, in terms of providing reasonably accurate location information as quickly as possible."[10]

It should not come as a surprise to the Commission that there is no technology capable of supplying Phase II location information that meets the FCC's requirements on TDMA and GSM networks.[11] Cingular has consistently made this point:

January 1995 — "[T]he proposed timetables [for location information] do not appear to contemplate the substantial technical challenges and implementation issues involved . . . [A location] technology must operate within a range of air interface methods, must provide consistent location accuracy commensurate with the expectations of the PSAP, and must meet certain cost goals. Today, no location technology has passed these hurdles. . . ."[12]

---

[10] *Id.* at 17458. Cingular believes that the Phase II technologies it has chosen, once deployed, will improve in accuracy over time.

[11] The Commission based the accuracy standards on the assumption that the necessary location technologies would be developed prior to the Phase II deadline. *See Fourth MO&O*, 15 F.C.C.R. at 17451. The Commission has long recognized that it is "required to reexamine the public interest basis of rules when the basis asserted by the Commission no longer exists." *See Review of the Pioneer's Preference Rules*, ET Docket No. 93-266, *Second Report and Order and Further Notice of Proposed Rulemaking*, 10 F.C.C.R. 4523 (1995); *see also Bechtel v. FCC*, 957 F.2d 873, 881 (D.C. Cir.), *cert. denied,* 113 S.Ct. 57 (1992) (stating that "an agency may be forced to reexamine its approach 'if a significant factual predicate of a prior decision . . . has been removed.'"); *Geller v. FCC*, 610 F.2d 973, 980 (D.C. Cir. 1979) (stating that "the vitality of conditions forging the vital link between Commission regulations and the public interest is . . . essential to their continuing operation"); *Cincinnati Bell Tel. Co. v. FCC*, 69 F.3d 752 (6th Cir. 1995).

[12] BellSouth Comments, CC Docket No. 94-102, at 15 (Jan. 9, 1995).

March 1995	"PCIA asserts that location information accurate within 125 meters is at least 8 years [2003] away . . . [T]he JEM Report[13] determined that none of the technologies was advanced enough to warrant the imposition of an ALI accuracy requirement such as that proposed by the Commission. . . . [Cingular] requests that the Commission defer consideration of specific ALI requirements for wireless systems until affected industry and technical groups establish standards, and determine that accurate, economically feasible location technologies are available."[14]
March 1996	"[M]any unanswered questions remain regarding the technical and economic issues concerning the imposition of enhanced 911 ('E911') requirements on wireless providers. . . ."[15]
September 1996	"The Commission's proposal of establishing higher accuracy requirements for location technology is premature. Even after many attempts, there has never been a successful field demonstration of the feasibility of using location technologies to provide 911 services. . . . To mandate standards, as the Commission states, with the intent that the standards themselves 'will act as an incentive to spur continuing efforts to develop improved location information technologies' in the absence of any reliable technology or uniform standards would be arbitrary and capricious."[16]
October 1996	"[Cingular] and others have urged the Commission to reconsider its Phase II implementation deadline because *it is unlikely that the technology will be readily available in time to ensure compliance with the deadline.*"[17]
October 1996	"The Commission's proposal of establishing higher accuracy requirements for location technology is opposed by every wireless trade association, every

---

[13] The JEM Report is the Emergency Services, Joint Experts Meeting Report, TR45/94.08.23.11 (Aug. 24, 1994).

[14] BellSouth Reply Comments, CC Docket No. 94-102, at 4, 5, 6 (Mar. 17, 1995) (citing PCIA Comments, CC Docket No. 94-102, at 8 (Jan. 9, 1995) and JEM Report at 2).

[15] BellSouth Reply Comments, CC Docket No. 94-102, at 1 (Mar. 11, 1996).

[16] Southwestern Bell Mobile Systems, Inc. ("SBMS") Comments, CC Docket No. 94-102, at 5-6 (Sept. 25, 1996).

[17] BellSouth Reply Comments, CC Docket No. 94-102, at 8 (Oct. 23, 1996) (emphasis added).

	wireless manufacturer and nearly every wireless carrier commenting in this proceeding. These twenty-two commenting parties state that the proposed requirements are either premature, unrealistic or technically impossible. . . . As stated before by [Cingular] and by many commenting parties, the Commission's initial Phase I and II location requirements from the Report and Order are extremely aggressive and should only be goals, rather than mandates."[18]
August 1999	"[Cingular] has not identified any location equipment that conclusively meets the current FCC accuracy requirements . . . Location equipment for certain air-interface technologies is not currently available, even in prototype versions."[19]
September 1999	"To date, [Cingular] has not identified any location equipment that conclusively meets the current FCC accuracy requirements. . . . Despite vendor claims, there remain major stumbling blocks for location technology equipment. Location within the central parts of certain buildings (large office buildings, shopping malls, parking garages, below-ground floors) is not possible in most cases with any technology."[20]
March 2000	"No technology is available that meets the Commission's newly created location accuracy standard and neither a handset nor a network solution is likely to be available that will permit licensees to meet the Commission's implementation deadlines for Phase II location capabilities."[21]
May 2000	"No technology currently meets accuracy mandates. . . . The October 1, 2001 Implementation Date cannot be met with handset or network based technologies. . . . Additional information on Vendor timing and volumes [is] needed to set realistic deadlines. . . . Accuracy problems will not be solved in time for 2001 implementation."[22]

[18] SBMS Reply Comments, CC Docket No. 94-102, at 6-7 (Oct. 25, 1996).

[19] BellSouth *Ex Parte* Presentation, CC Docket No. 94-102, at 3 (Aug. 27, 1999).

[20] BellSouth *Ex Parte* Presentation, CC Docket No. 94-102, at 15 (Sept. 2, 1999).

[21] BellSouth Reply Comments, CC Docket No. 94-102, at 1 (Mar. 2, 2000).

[22] BellSouth *Ex Parte* Presentation, CC Docket No. 94-102, at 1, 8 (May 17, 2000).

November 2000	"None of the location-technologies strictly met the relevant FCC accuracy mandate (network or handset) in all environments."[23]
January 2001	"[I]t appear[s] questionable that sufficient quantities of marketable handsets would be available in time to meet the FCC's deadlines, if at all . . . . A network solution for GSM is also not available in the timeframes required."[24]
March 2001	"[T]he network-based technologies currently under review do not meet the FCC's accuracy standards."[25]

Cingular recognizes that vendors were telling the Commission a different story. Vendors' claims that Phase II location technologies existed that would satisfy the FCC's accuracy and deployment requirements were never substantiated, however, by independent tests conducted in real-world environments. In fact, as demonstrated below and in Attachment D, tests conducted by Cingular, after the vendors publicly announced that their solutions were compliant, proved otherwise. Moreover, none of the vendors' accuracy claims were provided with the statistical confidence required by OET Bulletin 71, Section V:

> Conclusions derived from test results should be stated for at least a 90 percent level of confidence. A 90 percent level of confidence means that performance can be expected to be at least as good in 9 out of 10 test areas with the same relevant characteristics.

Even before this statistical confidence is applied to vendor accuracy claims, the results from vendor tests do not satisfy the Commission's requirements. When the confidence factor is applied, the results

---

[23] Cingular Wireless LLC Report on Implementation of Wireless E911 Phase II, CC Docket No. 94-102, at 3 (Nov. 9, 2000) ("Cingular Implementation Report").

[24] Cingular *Ex Parte* Presentation, CC Docket No. 94-102, at 3 (Jan. 31, 2001).

[25] Cingular Interactive *Ex Parte* Presentation, CC Docket No. 94-102, at 1 (Mar. 12, 2001).

are even worse. For example, when the confidence factor is applied to a set of 100 test calls, the 67% accuracy is not the 67th worst error, rather it is the 74th worst error.[26]

The failure to acknowledge that the FCC's accuracy requirements cannot be met for a number of air interfaces may create an unreasonable public expectation that PSAPs can locate callers within 50 or 100 meters whenever they make an emergency 911 call. The record simply does not support this conclusion and steps should be taken immediately to eliminate this dangerous public mis-perception. Cingular supports working cooperatively and constructively with PSAPs to develop reasonable accuracy standards for location information and to educate consumers about what to expect as these technologies are deployed over time. The FCC, public safety community, and carriers share this responsibility. Again, there is no technology solution that can supply location information for GSM and TDMA networks with the accuracy and timeliness demanded by the Commission's rules.

II. CINGULAR'S E911 EFFORTS TO DATE

Cingular has been very active in the deployment of E911 technologies and has worked productively with a variety of PSAPs to deploy Phase I in an expeditious fashion. For example, Cingular was the first major CMRS provider to supply Phase I location information to multiple PSAPs in Texas. Cingular also has expended substantial resources in an effort to identify a Phase II technology solution.

---

[26] This counter-intuitive result is based upon statistics applied to the number of samples used in a location test. For example, if the 67th and 95th worst errors are taken from a set of 100 test calls, the statistical confidence is only 23%. This means that if the test is repeated 10 times, the 67% and 95% errors would be expected to be better in about 2 of the 10 tests, and worse in about 8 out of those tests. The formula for determining the samples that should be used as the 67% and 95% accuracy figures (with 90% confidence) is provided in Section V of OET Bulletin 71. A more detailed discussion of OET Bulletin 71 and its impact on accuracy measurements is contained in Attachment D.

Identifying a Phase II solution has been difficult because there is no technology currently available that satisfies the Commission's accuracy and deployment criteria on GSM and TDMA networks. This task was further complicated because Cingular faces the uncommon task of evaluating the potential methods for deploying Phase II location technologies on a nationwide basis over different air interfaces — GSM and TDMA. At the same time, Cingular is solving the complex issues surrounding the migration from TDMA to a new air interface.[27] Moreover, as discussed below, recent developments have made it virtually impossible for Cingular to identify a compliant Phase II technology for its TDMA networks.

Cingular has been actively pursuing solutions for providing Phase II location information since early 1996. In March 1996, Cingular issued a Request for Information ("RFI") to more than 150 equipment vendors and organizations involved in 911, wireless, and location technology businesses. The RFI sought:

> information about technology, products, systems, hardware, and software and ideas that [Cingular] could employ to provide wireless caller location information for E911 emergency services. This information may relate to current or future offerings, including those under development or in the advanced stages of research.[28]

As a result of the RFI, it became readily apparent that no end-to-end solution existed for providing accurate, detailed location information for 911 calls.

During this same period, Cingular began working with handset vendors, location technology vendors, switch vendors, carriers, and public safety entities to develop an interoperability standard for

---

[27] *See* pages 19, 25 *infra*.

[28] *See* Attachment B.

supplying Phase II E911. Because of the complexity associated with locating a 911 caller and passing it along to the appropriate PSAP in a timely fashion, a uniform standard is required. Through the hard work of all involved, the requisite standard (J-STD-036) was completed and initial publication took place in August 2000. Because it normally takes 18 to 24 months after publication of a complex standard like J-STD-036 for vendors to develop compliant equipment and have it generally available, it is highly unlikely that vendors could meet an October 2001 equipment delivery date — assuming there was a solution for providing Phase II location information consistent with the Commission's regulations.

Because of the October 2001 Phase II implementation deadline, Cingular and other CMRS carriers needed to begin testing solutions prior to adoption of an E911 technology standard, now embodied in J-STD-036. Beginning in May 1999, Cingular has tested virtually all types of location technologies across most environments.[29] Cingular has conducted or participated in field trials of every different type of location technology available for the GSM and TDMA air interfaces. These trials commenced in 1999 and continue today. The specific environments tested for Time Difference of Arrival ("TDOA"), TDOA/Angle of Arrival ("AOA"), RF Mapping, Enhanced Observed Time Difference of Arrival ("E-OTD"), and Global Positioning System ("GPS") technologies are summarized in the following table:

---

[29] *See* Declaration of Dr. Andrew W. Clegg at 1 (Attachment H) ("Clegg Declaration").

CINGULAR'S PHASE II TEST ENVIRONMENTS

ENVIRONMENT	TDOA	TDOA/AOA	RF Mapping	EOTD	GPS
URBAN					
Urban Canyon	X	X	X	X	X
Indoor, metal frame building	X	X	X	X	X
Bus, in motion					X
Car, stationary	X	X	X	X	X
Car, in motion	X	X	X	X	X
Parking garage	X	X	X	X	X
Hotel room			X		X
Airport departure gate					X
SUBURBAN					
Pedestrian outdoor, stationary	X	X	X	X	X
Car, stationary	X	X	X	X	X
Car, in motion	X	X	X	X	X
Shopping mall	X	X			X
Movie theater					X
Grocery store	X	X			X
Convenience store	X	X		X	X
Laundromat				X	
Wood frame house					X
Park	X	X	X	X	X
Beneath dense foliage	X	X	X		X
Beneath highway overpass	X	X			X
Basketball arena					X
Restaurant	X	X			
RURAL					
Open field	X	X			X
Car, stationary	X	X			X
Car, in motion	X	X			X

The results of individual trials are covered under non-disclosure agreements with various vendors. On many occasions before the FCC and in other public *fora*, however, Cingular has clearly stated that none of the technologies that it has tested can meet the present accuracy requirements contained in Section 20.18.[30] Without divulging the results of specific trials, the yield of the test results demonstrated that network-based solutions were *unable* to meet the FCC's accuracy requirements. Moreover, no technology stood out as superior in *overall* performance across *all* environments. Although many technologies performed well in certain environments, they were all sufficiently lacking that none completely satisfied the FCC's accuracy requirements.

Given the complexity of Phase II location technology tests, it is extremely difficult to describe these results in a summary fashion. What follows is a short description of the technologies tested by Cingular and their shortcomings. Additional information regarding these tests, including accuracy figures, can be found in Attachment D.

TruePosition. On February 24, 1999, TruePosition reported that its technology satisfied the FCC's accuracy requirements.[31] Three months later, Cingular tested TDOA equipment manufactured by TruePosition in Harris County (Houston), TX, a Cingular TDMA market. Due to a court order,[32]

---

[30] *Id.* at 1-2.

[31] TruePosition *Ex Parte* Presentation, CC Docket No. 94-102 (Feb. 24, 1999).

[32] *Greater Harris County 9-1-1 Emergency Network v. BellSouth Cellular Corp., American Cellular Corp. and Houston Cellular Co.*, Protective Order, No. 99-25658 (Tex. Dist. Ct., Harris County, TX, 165th Jud. Dist., Jan. 21, 2000).

Cingular cannot disclose these test results. The Commission would have to obtain the results directly from TruePosition.

Cingular notes that AT&T conducted a test of TruePosition's technology under "a typical real-world operating environment representative of [AT&T's] national [TDMA] network" and that "[t]he technology tested in this trial failed to meet FCC accuracy requirements for a network-based location system."[33] Although TruePosition now claims, without corroborative test results, that AT&T's test results are not indicative of the accuracy achievable because the test was conducted "eighteen months ago,"[34] the fact remains that TruePosition claimed that its technology complied with the FCC's accuracy requirements at the time it was tested. TruePosition has since acknowledged the inadequacies of its solution in rural areas and has requested that the Commission relax its accuracy requirements accordingly.[35]

[BEGIN CONFIDENTIAL REDACTION]

SnapTrack. In July 1999, SnapTrack claimed that its handset-based assisted GPS ("A-GPS") location technology satisfied the Phase II requirements and could provide accuracy within three to seventy five meters.[36] In December 1999, Cingular tested SnapTrack's technology on a GSM

---

[33] AT&T Waiver, TruePosition Test Report at 10.

[34] TruePosition *Ex Parte* Presentation, CC Docket No. 94-102, at 1 (May 30, 2001).

[35] TruePosition *Ex Parte* Presentation, CC Docket No. 94-102, at 3 (July 24, 2000) (indicating that its solution may be unable to meet the FCC's accuracy requirement in rural areas even if it modified every cell site in a market).

[36] SnapTrack *Ex Parte* Presentation, CC Docket No. 94-102, at 5 (July 2, 1999).

network in Charlotte, NC.[37] A backpack-based system was used to conduct the test because there were, and currently are, no GSM or TDMA handsets available that incorporate SnapTrack's A-GPS technology. The backpack-based system was used to place test calls from a variety of suburban and light urban locations, including indoor and outdoor areas. Although the SnapTrack system performed well in outdoor environments, indoor test results were extremely poor, effectively negating the outdoor results. Indeed, indoor call yield and accuracy were so low that meaningful comparisons with the Commission's accuracy standards could not be tabulated.

SigmaOne. In August and December 2000, Cingular tested TDOA/AOA equipment manufactured by SigmaOne in San Antonio, TX — a TDMA market.[38] Test calls were placed from urban and rural locations around San Antonio. Cingular did not obtain the raw data from the urban test, but SigmaOne's summary of its test results was encouraging. The overall results provided by SigmaOne — including results from rural trials — indicated, however, that this technology could not meet the FCC accuracy requirements for network-based solutions.

Cambridge Positioning Systems. Between July and October 2000, Cingular observed E-OTD trials presented by Cambridge Positioning Systems ("CPS") in Houston, TX.[39] CPS conducted the trials using prototype handsets across a limited network infrastructure and, as a result, Cingular was unable to observe E-OTD while a call was in progress and the phone was in motion (*i.e.*, a typical

---

[37] *See* E911 Phase II Trial Results at 11-14 (Attachment D).

[38] *See id.* at 16-18.

[39] *See id.* at 18-19.

mobile scenario). Rather, Cingular was only able to observe E-OTD in motion while the phone was in idle mode. These tests demonstrated that the CPS system was unable to locate an E911 caller within the Commission's accuracy parameters.

U.S. Wireless. In August 2000, Cingular tested U.S. Wireless' RF mapping technology — "RadioCamera" — in Arlington and Alexandria, VA, two cities located within a TDMA market.[40] The RadioCamera technology requires careful calibration and extensive drive testing in order to achieve acceptable results. In its results, U.S. Wireless did not even claim system accuracy for locations within the test area that were more than 30 meters from a calibrated route. In calibrated areas, RadioCamera failed to meet the FCC's Phase II accuracy requirements. As expected, the results obtained from the non-calibrated areas were even worse. Indoor testing was not possible.

[END CONFIDENTIAL REDACTION]

Last year, Cingular issued a Request for Quote ("RFQ") to seven network-based location technology vendors in order to "obtain detailed supplier technical, planning, and pricing information" regarding potential Phase II location information.[41] Five vendors responded to the RFQ and provided detailed cost and deployment information. Based on this information and the tests it previously conducted, Cingular concluded that traditional network-based solutions were not a feasible solution for providing Phase II location information for its GSM and TDMA networks.

---

[40] *See id.* at 14-16.

[41] BellSouth Cellular/SBC RFQ, Network Solution for E911 Phase II, at 3 (2000) (Attachment C).

On November 9, 2000, Cingular submitted a Report on Implementation of Wireless E911 Phase II ALI detailing its preliminary plans for Phase II E911 deployment. Cingular stated that none of the available technologies (whether handset- or network-based) met the relevant FCC accuracy mandate in all environments, but that "[s]ome of the technologies showed promise of improvement and possible eventual compliance with the FCC accuracy mandate, given sufficient time for further development and calibration."[42] Cingular indicated that it planned on providing Phase II location information for its GSM networks via GPS-assisted handsets and for its TDMA networks via a network-based solution.[43]

III. CURRENT STATUS OF PHASE II LOCATION TECHNOLOGIES

A. Phase II Technologies for GSM Networks

Cingular continues to believe that the best solution for providing Phase II location information via its GSM networks would be the deployment of a handset-based GPS technology.[44] It is now clear, however, that these GPS-enabled handsets will not be available for GSM subscribers in time to meet the implementation deadlines contained in Section 20.18(g).[45] Moreover, Cingular has been unable to verify the existence of another Phase II solution that currently provides fully compliant location

---

[42] Cingular Implementation Report at 3.

[43] *Id.* at 2.

[44] *Id.*

[45] *See* Cingular *Ex Parte* Presentation, CC Docket No. 94-102 (Nov. 22, 2000); Cingular *Ex Parte* Presentation, CC Docket No. 94-102 (Jan. 30, 2001); Cingular *Ex Parte* Presentation, CC Docket No. 94-102 (Mar. 12, 2001); ALLTEL Communications, Inc. E-911 Phase II Technology Report, CC Docket No. 94-102, at 9 & Appendices B-D (Nov. 9, 2000).

information for GSM networks. The Commission has previously recognized that GSM carriers face "special circumstances" with respect to Phase II E911 because "the development of ALI capabilities for use by GSM carriers has lagged behind that for carriers using other interfaces. . . ."[46] The Commission has recognized that E-OTD "may be the only method available to GSM carriers for compliance with Phase II for some time."[47]

Moreover, the Commission has recognized the substantial public safety benefits inherent in the use of E-OTD technology, "including rapid initial deployment of ALI capability, with a relatively brief transition to even more precise levels of accuracy."[48] Carriers can more rapidly implement E-OTD, and do so at a lower cost, because deployment requires only handset software modifications and some additional network equipment — but no modifications to antenna supporting structures. Additionally, E-OTD's position as the *de facto* location standard for GSM will ensure that the technology is incorporated into all future GSM handsets.[49]

Cingular believes that E-OTD is the only viable option for its GSM networks in the absence of a handset-based GPS solution. Cingular is not alone — virtually every other GSM carrier has indicated that it plans on deploying E-OTD.[50] Although this solution will not meet the Commission's handset-

---

[46] *Fourth MO&O*, 15 F.C.C.R. at 17460, 17462.

[47] *Id.* at 17461-62.

[48] *Id.* at 17463.

[49] AT&T Waiver at 4.

[50] *Fourth MO&O*, 15 F.C.C.R. at 17463 (granting a waiver to VoiceStream); Carolina PCS Waiver at 3-4; AT&T Waiver at 4-6; PCS One Waiver at 2-4.

based accuracy standards initially, E-OTD accuracy will continue to improve "as the software is refined"[51] and carriers migrate to higher bandwidth 3G technologies.[52] Initially, this technology should be capable of supplying accuracy of 100 meters/67 percent of the time and 300 meters/95 percent of the time.[53] An industry consensus appears to be forming that E-OTD handsets will satisfy the Commission's accuracy requirements by October 1, 2003.[54]

Some TDOA/AOA location technology vendors have claimed that equipment is available for supplying location information consistent with the FCC's accuracy requirements over the GSM air interface. In all cases, this statement is only partially true and, at best, grossly ignores the practical considerations of deployment. For example, none of the GSM network-based solutions can work until the vendors' equipment is interfaced with the network infrastructure, since GSM signals are heavily encrypted. Establishing this interface requires close collaboration between the location vendor and the GSM infrastructure vendor. To Cingular's knowledge, no location vendor has successfully completed such an interface with a major GSM infrastructure vendor. Without this interface, network-based location technology cannot work on the GSM air interface. Thus, Cingular agrees with other GSM carriers that "no vendor can provide A-GPS or TOA technology for . . . GSM networks in sufficient

---

[51] *Fourth MO&O*, 15 F.C.C.R. at 17463.

[52] AT&T Waiver at 5.

[53] *Fourth MO&O*, 15 F.C.C.R. at 17463-64.

[54] *Id.* at 17464.

time to meet the Commission's E911 Phase II requirements."[55] Even if there were a network-based solution for GSM networks, location information would be unavailable for Cingular's customers roaming on most other GSM networks if Cingular deployed this type of solution.

B. Phase II Technologies for TDMA Networks

Cingular has been exploring a migration away from the TDMA air interface over the last 18 months. Although Cingular's path to full Phase II compliance is necessarily tied to this air interface decision, Cingular has not ignored its Phase II responsibilities. Cingular has reviewed all of its data and available test results compiled over the last two years. Unfortunately, this compilation demonstrates that no technology exists that would fully satisfy the accuracy requirements contained in Section 20.18(h) of the Commission's rules.

Thus, Cingular is faced with satisfying the Commission mandate that: "if no solution is available that fully complies, the carrier [is] expected to employ a solution that comes as close as possible, in terms of providing reasonably accurate location information as quickly as possible."[56] This is not an easy task. As TruePosition has noted, "TDMA systems present the most difficult challenges for location technologies of any of the modulation techniques employed by wireless carriers."[57]

---

[55] VoiceStream *Ex Parte* Presentation, CC Docket No. 94-102, at 2 (Feb. 5, 2001); AT&T Waiver at 5-6 & n.17.

[56] *Fourth MO&O*, 15 F.C.C.R. at 17458.

[57] TruePosition *Ex Parte* Presentation, CC Docket No. 94-102, at 3 (May 30, 2001).

Further, handset vendors have announced that they will no longer be focusing development efforts on TDMA handsets.[58] Consequently, no handset vendor is willing to commit to supply Phase II compliant equipment compatible with TDMA networks.[59]

With respect to network-based solutions, they can be broken down into two categories — full network and switch-based solutions. Based on the tests conducted by Cingular, and confirmed by other carriers that have requested similar waivers, full network solutions are not feasible. These solutions fail to satisfy the Commission's accuracy requirements, and they would be deployed at an extremely slow rate compared to other solutions. Moreover, these solutions are cost-prohibitive.[60] Only switch-based solutions are capable of providing reasonably accurate location information *and* being deployed rapidly on TDMA networks.[61] These switch-based solutions are all very similar and require minimal modifications beyond the switch. Cingular has been actively pursuing switch-based solutions since early 2000.

---

[58] Letter from Michael Flemming, Carrier Strategy Manager, Nokia Mobile Phones, to Jim Sheehan, Director, Equipment and Logistics, Triton PCS (June 8, 2001) (Attachment I) ("Nokia Letter"); Letter from Lenny Frucht, Senior Regional Business Manager, Motorola, to Jim Sheehan, Director, Equipment and Logistics, Triton PCS (June 5, 2001) (Attachment I) ("Motorola Letter"); Letter from Robert J. Miklosko, Director, Product Planning, Panasonic, to Jim Sheehan, Director, Equipment and Logistics, TritonPCS (May 30, 2001) (Attachment I) ("Panasonic Letter").

[59] *See* Nokia Letter at 1; Motorola Letter at 1; Panasonic Letter at 1.

[60] *See Fourth MO&O*, 15 F.C.C.R. at 17463. For a detailed discussion of the impact on rural carriers with respect to deploying these solutions, *see* Corr Wireless Communications, L.L.C., Petition for Waiver, CC Docket No. 94-102 (June 22, 2001).

[61] *See Fourth MO&O*, 15 F.C.C.R. at 17458.